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THE STATUS OF FORESTRY IN THE UNITED STATES.

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[Cir. 167]

THE STATUS OF FORESTRY IN THE UNITED STATES.

THE FOREST SITUATION.

A very few years ago "forest conservation" was little more than a phrase; to-day it is a vital issue in our National development. In connection with the general plan to conserve all natural resources, it is the most important and far-reaching economic policy ever adopted and pursued by any nation. It affects the every-day life of every man in his work, in his recreation, and in his home, and it deals with such questions as whether the earning power of his labor and the purchasing power of what he earns are to be reduced or maintained, whether what are now his comforts will, of necessity, become his luxuries, and whether he is to be a citizen of an impoverished, backward nation or of a rich and progressive one.

These things are bound up with the practice of forestry because the forest is one of the chief supports of the whole material fabric of our civilization. The forest means not only a permanent supply of wood and the life of all the industries which depend upon it, but also the control of the waters for human use. There is only barrenness in the future of the nation which has lost the use of wood and the control of water.

The sort of use that was made of natural resources during the pioneering stage, while right enough at the time, is far too wasteful to be carried on into the new industrial era. In order to know how to use a thing, however, it is necessary first to find out how much of it there is to use, and taking stock of our forest resources has led to startling results.

It has shown that we are still destroying the forest as we use it; that we are taking from it every year three and a half times as much wood as is added by the new growth. It has shown that less than one-third of the growing tree felled by the lumberman is ever used at all, so that two-thirds of all the timber cut is simply destroyed. It has shown that one-eleventh of all the forests are swept by fires every year, and that on the average since 1870 forest fires have yearly cost $50,000,000 in timber and 50 lives. It has shown that over 99 per cent of the forests in private hands—which comprise three-fourths of all the forest land and four-fifths of all the wood—is thus devastated

by destructive use and the scourge of unchecked fires, while less than 1 per cent is properly handled for successive crops or effectively protected from fire. The forest as a resource is rapidly being obliterated.

But the inventory of the forests has had yet other ugly facts to reveal. With the disappearance and deterioration of the mountain forests the Nation is losing control of the streams, which are useful in our civilization in ways and degrees unparalleled by any other resource. Pure water for domestic purposes is, of course, indispensable; usable water at the right seasons is the sole reliance of the great projects by which the arid lands are vivified by irrigation; cheap water transportation is a matter of dollars and cents to every citizen; trustworthy power streams are the key to the age of electricity, at the gates of which modern industry is standing. Yet the guardian of the waters is steadily compelled to retreat before the ax and fire.

It is not use which destroys the forests, but waste. Not use as such, but destructive use, combined with inexcusable neglect, is causing the forests to dwindle under our progressive demands upon them. The problem, therefore, is not to be solved by disuse, but by wise use and protection. These together will so stimulate forest growth that the needed wood may be harvested without depleting the stock on hand, and will keep intact the protective cover at the stream sources.

In waste alone we reject more than two-thirds of the lumber that might be taken from the standing trees. At least half of this waste is unnecessary. In the first place, we waste the forest by refusing to take advantage of its full capacity for growth. Protected and properly managed, our forests will produce far more wood than they do at present. But while it is wasteful to cripple the forest by a violent lumbering which destroys young growth—the promise of the future forest—it is doubly wasteful to lock up the forest and let the ripe timber die and decay, for in the former case the forest at least contributes a temporary supply of wood, whereas in the latter case it contributes no wood at all.

What is being done to cope with the situation thus disclosed, and what remains to do? What is the work of the National Government? What are the States doing to conserve their forests? What advance has been made in the practice of forestry by private owners of timberlands and woodlots? These questions will be briefly answered in order.[a]

[a] Forest Service publications dealing with the forest situation are: Circular 35: Forest Preservation and National Prosperity; Circular 140: What Forestry Has Done; Circular 157: A Primer of Conservation; Circular 166: The Timber Supply of the United States.

WHAT THE NATION IS DOING.

THE NATIONAL FORESTS.

Congress authorized the President to establish National Forests in 1891. They were called "forest reserves" then, and in fact they were "reserves," for Congress did not at that time make provision for the use of their great resources, which are estimated to be worth over $2,000,000,000. A law was passed in 1897, however, which made it possible to use and to protect their resources. To give them a name in better accord with their object, the "reserves" were renamed "National Forests" by Congress in 1907. Now there are nearly 195,000,000 acres of National Forests, including about 27,000,000 acres in Alaska and Porto Rico. The Appendix contains a list of them.

The object of the administration of the National Forests is to use them in such a way that they will yield all their resources to the fullest extent without exhausting them, for the benefit primarily of the home builder. The controlling policy is serving the public while conserving the forests.

The administration of the Forests by men actually on the ground is secured by grouping the 150 Forests in 6 districts, with headquarters, in the districts, at Missoula, Denver, Albuquerque, Ogden, San Francisco, and Portland. This arrangement also guarantees dispatch in business and prompt payments. Only matters of exceptional importance are referred to the Forester, in Washington.

DISTRICT OFFICES.

Each of the district offices has at its head a district forester and an assistant district forester. A chief of grazing has charge of range matters. A chief of products handles the preservative treatment and strength tests of timber, and studies market conditions. A chief of silviculture has charge of timber sales, planting, and silvical experiments. A chief of operation supervises the personnel of the Forests; the permanent improvement work, through an engineer in charge; the accounts of the district; and the routine business. The Forest Service never passes on the land titles themselves; this matter rests always with the General Land Office of the Department of the Interior.

Each of the chiefs and assistant chiefs of office spends about half of his time in the field on forest work.

FOREST OFFICERS AND THEIR WORK.

Every Forest is immediately under the charge of a forest supervisor. The supervisor may be a trained forester, but in any case

he is always selected for his wide practical knowledge of the West and of lumbering and grazing in particular. If not a trained forester himself, he has such a man as an assistant.

It is the business of the forest supervisor and his forest assistant gradually to bring their Forest under practical, conservative management—to make every square rod of forest land produce tall, straight timber trees of the best quality. Each step, from the care and protection of the young growth to the lumbering of the mature forest, must be carefully planned and as carefully executed. Permanence is the ideal striven after; the forest must go on producing trees as long as trees are needed.

For each of the many lines of work carried on in the National Forests, men with practical experience are employed. The planting assistant, who prepares and tends the nurseries, must be well practiced in raising and caring for young trees. The lumberman, who cruises and estimates timber, helps to plan logging operations, and sees that the scaling is correctly done and that rules for logging are properly observed, must be an experienced and capable woodsman. The forest ranger patrols his district of the Forest to see that fire and trespass are prevented, that the range is not overgrazed, that logging regulations are enforced, and that the permits granted for the use of the various forest resources are not abused; and he also must be hard-headed, practical, and thoroughly honest, an able-bodied citizen of the West, with plenty of experience in all the problems with which he may have to deal. The forest assistant is usually a college graduate with a technical training in forestry. In addition to his scientific training, the American forester must have abundant practical experience in the woods, on the range, and in the mills, for he must thoroughly understand all conditions before attempting to work out a system of good business management for any Forest.

Following is the number of forest officers on duty on December 31, 1908:

Supervisors	106	Deputy forest rangers	420
Deputy forest supervisors	70	Assistant forest rangers	413
Forest assistants	117	Forest guards	151
Forest planting assistants	11		
Lumbermen	17	Total	1,493
Forest rangers	188		

NATIONAL FOREST BUSINESS.

The following tables show the growth of the timber sale and grazing business of the National Forests from 1904 to 1908, inclusive (fiscal years):

Timber sales.

Fiscal year.	Amount of timber sold.	Amount of timber cut.	Receipts from timber sales.
	Board feet.	*Board feet.*	
1904	112,773,710	58,425,000	$58,436.19
1905	113,661,508	68,475,000	73,270.15
1906	328,230,326	138,665,000	245,213.49
1907	1,044,855,000	194,872,000	686,813.12
1908	386,384,000	392,792,000	773,182.33

Grazing business.

Year.	Number of cattle and horses.	Number of sheep and goats.	Receipts.
1904	610,091	1,806,722	.....
1905	692,124	1,709,987	.....
1906	1,015,148	5,763,100	$514,692.87
1907	1,200,158	6,657,083	863,920.32
1908	1,380,145	7,085,311	962,829.40

A remarkable growth in business took place in the fiscal year 1908. While in that year money available increased only 20 per cent and the area of forest administered increased only 11 per cent, the business done increased in the following percentages:

	Per cent.
Timber sales	236
Timber cut	102
Number of free-use permits	76
Number of special-use permits	67
Sales and fees received	20
Number of grazing permits	11
Total number of sales and permits	46

During that year timber to the amount of 386,384,000 board feet was sold in 5,062 separate sales. Of these sales 4,584 were made for timber valued at $100 or less.

The uses to which the resources of the Forests are put are classified as follows: (1) Timber sales, (2) free use of timber, (3) grazing, and (4) special uses, the most important of which is the development of water.

TIMBER SALES.

All timber within the National Forests which can be cut safely, and for which there is actual need, is for sale. Green timber may be sold except where its removal would make a second crop doubtful, reduce the timber supply below the point of safety, or injure the streams. The limited supply on some Forests prevents sales except for local use. All dead timber is for sale.

Timber cut from National Forests may be handled and shipped like any other timber, except that it will not be sold for shipment

from regions where local consumption requires the entire supply, or is certain to do so in the future. The law prohibits export from South Dakota of any timber from the Black Hills National Forest, unless cut from dead or insect-infested trees.

Anyone except a trespasser may purchase timber upon the National Forests. There is no limit but the capacity of the forest to the quantity which may be sold to one purchaser, except that monopoly to the disadvantage of other users of forest products will not be tolerated.

Purchases of less than $50 worth of timber can be arranged with the nearest forest officer. Larger sales, up to the limit set by the Forester, are handled by the supervisor of the Forest, while sales for amounts above the limit set for supervisor's sales require the approval of the district forester. In all sales involving $100 or more, advertisement is made for competitive bids, on the basis of a minimum stumpage price, and the timber is sold to the highest bidder.

Since no cutting or logging of timber for sale is done by the Government, the silvicultural measures required to renew and improve the forest are provided for in the sales contracts, and are mainly executed by the purchaser. Logging is expensive in the present undeveloped condition of the country, and if the stipulations of the contracts are too burdensome the would-be purchaser will be turned away. On the other hand, the good of the forest, as well as the local demand for timber, requires that ripe National Forest timber and, above all, dead and diseased timber, be removed. In its timber-sale policy the Service seeks constantly to work out a compromise between these conflicting conditions and to secure the welfare of the forest and the development of the community together. In carrying out this policy its main reliance is the use of marking rules prepared for each of the forest types, by which reproduction is secured by leaving seed trees and a steady improvement made in the condition and make-up of the forest. In accordance with these rules, trees are carefully marked for cutting in each sale as local forest and market considerations dictate. The provisions of the timber-sale contracts cover such essentials of good forest work as care against injury to young growth; low stumps; full utilization of the tree; the removal of inferior trees and often of undesired species; and the proper disposal of brush—in piles for burning or scattered evenly, as the case demands. A marked improvement in forest conditions attests the success of the silvicultural treatment under these limitations.

FREE USE OF TIMBER.

Forest officers are authorized to grant permits without charge for $20 worth of timber during any one year to persons who may not reasonably be required to purchase. This amount may be increased

in cases of great and unusual need, or to assist enterprises of a public or benevolent character. Under these regulations timber is taken from every National Forest for fuel, fencing, and building material required by settlers, for mining timbers needed in developing mineral claims, and for such community uses as the construction and maintenance of schools, churches, and bridges. More than 30,714 free-use permits were issued in 1908, in which year about one-fourth of all the timber cut from the National Forests was under free-use permits.

The purpose of this free-use privilege is to make the Forests contribute most effectively to the public welfare. The timber given to individuals is given for the development of the country through settlement. It is not proposed to give timber to persons living on or near National Forests, even for their own use, when they may reasonably be expected to buy. As the home builder becomes established it is fair that the individual should be required to supply his private needs by purchase. On the other hand, permanent provision will be made for community needs through the setting aside of definite areas of timber to be held for free use. Settlers on agricultural land within National Forests will also be liberally supplied with timber for their legitimate needs, since it is to the interest of the Forests themselves, as well as for the best development of the West, that settlement within the Forests should be encouraged wherever the land is most valuable for agriculture.

GRAZING.

In the National Forests grazing is regulated in the interest of the stockmen, who pay for permits. The leading objects of the grazing regulations are: (1) The protection and conservative use of all National Forest land adapted for grazing; (2) the permanent good of the live-stock industry through proper care and improvement of the grazing lands; and (3) the protection of the settler and home builder against unfair competition in the use of the range.

There are many open parks in the Forests and many areas of high altitude above the timber line which produce valuable crops of forage grasses and plants. A large portion of the forested land also produces a good crop of forage in addition to a crop of timber.

These lands have been occupied by the stockmen ever since the first settlement of the country, and the live-stock industry is largely dependent upon them. Some portions of the range have been greatly overstocked, and serious damage has been done. Overgrazing has destroyed the grasses in some localities and serious erosion of the soil has followed. It is in order to stop this damage and protect the Forests in a way which will accomplish the objects for which they are created that grazing is regulated. The cooperation of the

stockmen is invited in bringing about any necessary changes, and every effort is made to utilize the range to the fullest extent compatible with the protection of the forests.

The range is classified and divided between the owners of different kinds of stock, and when local conditions will permit it individual range allotments are made. When necessary for proper control of the stock, or to prevent losses from poisonous plants and straying, fences are constructed in cooperation with the stockmen. Under a proper regulation in the use of a range, the quality of the stock is improved and the weight of the animals increased over that of animals from other ranges where grazing is unrestricted. Improvement in the methods of handling the stock results in a better utilization of the forage and an increase in the number of stock which may be grazed upon the range. During the season of 1908 permits were issued to 24,000 different owners, allowing 1,380,000 cattle and horses and 7,000,000 sheep and goats to be grazed upon the National Forests. The revenue derived from grazing this stock was $960,000.

SPECIAL USES.

All uses of National Forest lands and resources, except those which relate to timber and grazing, are known as "special uses," among which are included the following: Residences, farms, pastures, drift fences, corrals, apiaries, dairies, schools, churches, roads, trails, telephone and telegraph lines, stores, mills, factories, hotels, stage stations, sanitariums, camps, summer resorts, wharves, miners' and prospectors' cabins, windmills, dipping vats, tanks, dams, reservoirs, water conduits of all kinds, power houses, power-transmission lines, aerial tramways and cable conveyors, railroads, tramroads, and the purchase of sand, stone, clay, gravel, hay, and other National Forest products except timber.

For such permits a reasonable charge may be made. This charge is based chiefly upon the value of that which is actually furnished to the permittee by the Forest Service, including advantageous location and other indirect benefits, and not directly upon the profits or the magnitude of the business which is to be carried on.

The following table shows the number of special-use permits issued in the fiscal year 1908, and the revenue received therefrom:

Special uses, 1908.

	Number of permits.	Receipts.	Kinds of use.
Charge	2,684	$30,425.23	108
Free	3,239		
Total	5,923	30,425.23	

By far the most important of the special uses of Forest resources are those involving the commercial use of water for power. The National Forests include the great mountain chains of the West. The rain and melting snow of these ranges feed the mountain streams. The forest cover on the steep slopes acts like a mighty sponge, absorbing the excess of rainfall in the wet season and giving it out to the thirsty lands in the dry season. It is for the express purpose of thus "securing favorable conditions of water flows" (act June 4, 1897, 30 Stat., 34) that Congress has authorized the creation of National Forests and expends money for their administration and maintenance.

Where the forest cover is destroyed by reckless lumbering and the fires which inevitably follow, the rains immediately run off the steep slopes as from the roof of a house, producing destructive floods in the valleys and leaving no store of water for the dry season. Therefore, when a power company puts its plant on National Forest land it gets from the Government two things which it ought to pay for, viz: (*a*) The use of land of great value for power purposes, for the steep mountain sides give the fall which is essential to a power plant; (*b*) the guaranty of a steady flow of water as an incident to the land occupied by the plant. The practice of the Forest Service aims to prevent monopoly of undeveloped power resources by imposing the following conditions as a part of every permit, with the penalty of forfeiture for their breech.

Construction work and productive operation of the plant must begin within definitely stated, reasonable periods, unless the time is extended by written consent of the Forester. From the date of the permit until productive operation begins a construction charge is made at the approximate rates per annum of $1 per acre and $5 per mile of National Forest land occupied by the reservoir site and conduit line. Upon the beginning of the generation of electric energy at the power house the construction charge ceases and thereafter the only charge is a net operation charge fixed by the Forester. A gross operation charge is made on the basis of the electric energy generated. This charge does not exceed 2 cents per kilowatt hour for the first year, but may be increased not more than 2 cents for each of the four following years, and not more than 2½ cents for each five-year period thereafter, until the end of the fiftieth year. Deductions are made from the gross charge, at a fixed rate, for the area of private and unreserved land used in connection with the National Forest land and for the fall occurring on such private and unreserved land, and the sum remaining is the net operation charge.

The conditions in the permit as to charges are binding for a period of fifty years.

Permits provide for payment, at the prevailing rates, for any National Forest timber cut or destroyed in construction work, and

contain such other conditions as are necessary for the protection of National Forest interests.

PERMANENT IMPROVEMENTS.

Permanent improvements have during the past two fiscal years been provided for by special appropriations from Congress. Roads, trails, and bridges for readier travel and transportation and the protection of the Forests; telephone lines—one of the greatest aids in reporting fires and getting together a fire-fighting crew, as well as in the transaction of ordinary Forest business; drift and pasture fences for the control of stock, and watering places for their use; houses, barns, and corrals for various purposes, are transforming the Forests and insuring the safety and convenience of settlers and users.

The following table shows, by States, the kind and amount of permanent improvement work done in 1908:

Permanent improvements in National Forests, fiscal year 1908.

State or Territory.	Trails.	Roads.	Telephone lines.	Fences.		Houses.
				Drift.	Pasture.	
	Miles.	*Miles.*	*Miles.*	*Miles.*	*Miles.*	
Arizona	30½	1½	106½	25	47	23
California	543½	21¾	490	5½	49½	61
Colorado	266½	42½	517	57¾	93¾	49
Idaho	582½	120	193½	1	21¾	37
Montana	422½	45½	436	2	51½	53
Nebraska	.....	.....	92	.....	2	1
Nevada	.....	.....	.....	1½	2½	5
New Mexico	236¾	52¾	41	58½	61¾	28
Oklahoma	.....	.....	.....	2	1	1
Oregon	437	24	78	.....	39	23
South Dakota	.....	.....	.....	.....	7½	5
Utah	107½	34½	365½	11½	17	24
Washington	311¾	17	102	5½	28	22
Wyoming	32½	4	194½	1½	15½	16
Total	2,970	363½	2,523¾	171¾	437½	348

State or Territory.	Barns.	Corrals.	Bridges.	Watering places.	Amount expended.
Arizona	10	2	3	6	$27,872.95
California	28	.....	14	4	85,910.48
Colorado	17	1	7	7	65,700.86
Idaho	10	5	16	1	78,402.48
Montana	32	.....	7	.....	94,750.72
Nebraska	1	.....	.....	.....	2,985.54
Nevada	2	.....	.....	.....	3,748.13
New Mexico	8	1	1	1	31,463.51
Oklahoma	1	.....	.....	.....	1,462.00
Oregon	2	2	4	.....	55,191.33
South Dakota	4	.....	.....	.....	.....
Utah	4	.....	6	27	31,542.66
Washington	6	.....	4	.....	44,022.34
Wyoming	6	3	4	.....	15,945.48
Total	131	14	66	46	[a] 544,435.00

[a] Equipment on hand in the supply depot, Ogden, Utah, raises this total to $551,938.

THE PROTECTION OF FORESTS FROM FIRE.

The methods of controlling forest fires on National Forests consist in:

(*a*) Constant patrol of the areas included within the National Forest boundaries by a picked force of rangers and guards. The present summer force of rangers and guards whose main duty is fire patrol is 1,351 men; the average area that each is required to protect is 121,506 acres.

(*b*) The construction of roads and trails in order to provide rapid means of travel between the various parts of the National Forests and to facilitate the massing of large forces of men to fight fire, as well as to furnish vantage points from which fire may be fought successfully; and of telephone lines connecting ranger stations with the headquarters of the Forest in order that fires may be quickly reported and effective measures taken promptly to extinguish them. During the fiscal year ending June 30, 1908, 160 miles of road, 3,300 miles of trail, and 3,500 miles of telephone lines were constructed in the National Forests. In several cases also fire breaks from 16 to 100 feet in width have been constructed, from which all timber and inflammable material are removed. These check the spread of fire and afford lines of defense in fire fighting. Several miles of such fire breaks have been constructed on the National Forests in southern California, where it is especially important that the forest cover on the watersheds of important irrigation streams be protected.

(*c*) The equipment of the National Forest with fire-fighting tools, canteens, and other supplies necessary for fire-fighting crews. Just as rapidly as possible each National Forest will be fully supplied with shovels, axes, and other tools, which will be distributed over the Forests and in cabins and tool boxes placed at points where there is the greatest danger of fire and where they can be most easily reached by road or trail.

The Forest Service has been most successful in securing the cooperation of local residents in the vicinity of National Forests, and especially of the stockmen and others who use the Forests under permits of the various classes. Every permittee is required to assist the Forest officers in the suppression of fire, and this assistance has been of the utmost value.[a]

OTHER FOREST WORK OF THE GOVERNMENT.

In addition to administering the National Forests, the Forest Service carries on many lines of forest work; in the investigation of

[a] The Use Book (containing regulations and instructions for the use of the National Forests).

forest problems; cooperation with other Departments of the National Government, with States, and with private owners; the dissemination of information, and various kinds of educational work.

Cooperative work has been conducted with the War and Navy Departments, the Light-House Board of the Department of Commerce and Labor, and the General Land Office, the Reclamation Service, and the Office of Indian Affairs, in the Department of the Interior.

State cooperation.—The Forest Service cooperates with States in making examinations of their forest conditions and outlining forest policies necessary to protect and maintain the timber supply. Preliminary examinations are often followed by more comprehensive studies, which include, among other things, a detailed forest map and an estimate of the timber, plans for systematic management of the timberlands, and a general forest policy for the State. The cost of such examinations is shared equally by the Forest Service and the State. In addition, experiments in nursery practice and field planting are conducted in cooperation with State educational institutions and State forest commissions.

Private cooperation.—Private owners of timberland, large or small, may secure the aid of the Service in the care of their timberlands and in planting. Forest Service Circular 165 outlines the plan of cooperation with owners of timberlands. Any owner who wishes to learn whether forestry might be profitable to him may apply to the Service for an examination by one of its experts. A preliminary examination is made on the ground and a report in all cases is submitted to the owner. If the tract is large and the owner desires a working plan afterwards, a party is sent to collect the necessary data. The investigation is conducted from both the forester's and the lumberman's point of view. When the field data have been collected, a working plan is made which takes into account the special needs or purposes of the owner. The recommendations in the plan enable the owner to derive from the forest the fullest and most permanent revenue which is consistent with his special requirements. Applications for assistance of this character have been received from the owners of about 10,000,000 acres of forest.

The Forest Service provides two forms of assistance to prospective tree planters: (1) Advice for forest planting in all the principal planting regions, which can usually be given free of cost by means of publications and an advisory letter, together with lists of dealers who sell plant material of the species recommended; (2) examinations of tracts in regions where a detailed study has not been made, and which present problems of great economic importance and high experimental or educational value. As a result of such examinations, planting plans are usually prepared.

STATE FORESTRY.

The considerations which require the Nation to adopt a conservative forest policy require the State also to adopt such a policy. They are chiefly: The need of wood; the need of protection to stream flow, to the soil, and to agricultural crops; the economic advantage of putting all the land to its best use; the tendency of private action to conflict with the public interests unless education, cooperation, or regulation is provided by the State; and the duty of handing on the resources of the State, the common property of its people, to the citizens of the future, unimpaired by reckless use.

In comparison with the great need disclosed by a study of present forest conditions, the States have done exceedingly little toward the solution of the forest problem. Good work has been accomplished here and there, but in reviewing State forestry one is more impressed with the work that has been left undone.

LINES OF STATE ACTION.

The past lines of State action fall naturally under the following heads: (*a*) Protection of the forest against trespass; (*b*) protection of the forest against fire; (*c*) the promotion of forestry by various means; (*d*) the establishment of State forests and forest organizations charged with their care.

TRESPASS LAWS.

In general, the State laws against forest trespass are sufficient, but they are not enforced, and never have been, in any State. The nonresident forest owner is frequently so great a loser from trespass that he finds it cheaper to cut the timber before it has reached financial maturity—that is, before it is the best business to cut it. In order to recover damages and punish the trespasser, he must go to court and secure a jury that will convict, while the local interests are all on the side of abusing or at least neglecting the land in question, from which, nevertheless, they often derive a large proportion of the taxes. Though the trespass laws have helped to check large and continued trespass, the general laxity of their enforcement has seriously discouraged forestry.

FIRE PROTECTIVE SYSTEMS.

Eighteen States have organized fire protective systems. These are:

Alabama.
California.
Connecticut.
Louisiana.
Maine.
Massachusetts.
Maryland.
Michigan.
Minnesota.
New Hampshire.
New Jersey.
New York.
Oregon.
Pennsylvania.
Tennessee.
Vermont.
Washington.
Wisconsin.

It is interesting to note that the fire laws and amendments considered by experts the most satisfactory have been enacted within the past five years (California, Oregon, Maryland, Washington, New Jersey, Idaho, Minnesota, New York).

The fire organizations are variously headed; in some cases by the State forester or State forest commission and in others by a State firewarden specifically charged with fire protective work. The under officers consist of local town or county firewardens, usually of two grades. In a few cases special patrol officers are authorized. Firewardens may be: (1) Local State or county officers serving ex officio, without extra pay; (2) independent State, county, or town officers with pay; or (3) private employees appointed by the State, but without State pay and either with or without special pay from private owners. They possess the power to arrest without warrant, to impress, and in general to enforce the fire laws. Firewardens and similar officers are commonly authorized and directed to call out or impress extra help in putting out fires and to pay for such extra help at a fixed rate.

Nearly all of the States have long had legal provisions against setting fire to forests and waste land. In recent years, however, such provisions have been made more specific and effective. Willfulness or malice were formerly required in order to constitute the setting of fire a misdemeanor; but negligence is now commonly sufficient, and in some cases accident does not excuse. The laws include general penalties for fires; prohibitions against setting fires without permit during seasons of danger; provisions for safety appliances on locomotives and other engines, except those burning oil as fuel; the requirement that railroads keep their rights of way clear of inflammable material; and other similar requirements for railroads, such as that warning notices be posted at the stations or that employees be specially instructed in the preventing and extinguishing of fires.

The following improvements in existing fire protective systems are urgently required:

(1) Greater independence of the head officer and his direct responsibility to the governor. It is a distinct advantage to have a State firewarden who devotes his entire time to fire protection. He should be appointed from a nonpolitical State civil-service list and hold office during efficient service. His duties should include the personal superintendence and instruction of the local overwardens, who would be his own deputies; the appointment and removal of local officers when this is consistent with State and local policy; the auditing of firewardens' accounts; and the enforcement of fire laws against offenders. This arrangement is in the direction of State rather than local enforcement of the laws. The New Jersey provisions more nearly meet these requirements than do perhaps any of the other State forest-fire protective laws.

(2) Greater independence of local firewardens. There is at present a sound tendency away from adding the duties of a firewarden to the duties of existing offices. Firewardens should give all of their time to their work and receive pay for it.

(3) The extension of the plan, followed in part in California, Idaho, Oregon, and Washington, of appointing employees of private forest owners as State firewardens or rangers, the State delegating the powers of peace officers to such appointees and the forest owners bearing the added expenses, if any.

(4) A very great extension of patrol. Efficient patrol is the first essential of effective protection. The great object of all protective systems is to prevent fires, and patrol alone will prevent them. It is, therefore, good business for the State to pay for patrol on its own holdings; for the same reason patrol is the best kind of business for private owners, who should be, and usually are, entirely willing to bear their share of the burden, as they are required to do in Nova Scotia, may do in California, and will do in Wisconsin if a bill that has been presented is enacted into law. State rangers under the State forester or firewarden should be permanently maintained by the State, assisted by the voluntary or compulsory cooperation of private owners. Legal provision should be made for the appointment of employees of private owners as State firewardens, with the powers of such officials. Patrol may be limited to the dangerous season, except that district firewardens should patrol at all seasons. Where no merchantable timber remains on cut-over lands, and the owners of such lands are consequently indifferent to fire, there will not be effective local support or sufficient funds to maintain patrol. In such cases the State should acquire the land for State forest purposes and protect it by State patrol. The results would encourage the practice of forestry by private owners.

(5) Better provision for inspection.

(6) Further provision for cooperation between State and Federal Governments in the States having National Forests. At present the National Forest officers may be appointed State firewardens in California and Oregon. In order fully to protect the National Forests it is frequently of great importance to extinguish threatening fires outside of but adjacent to the Forests, and it is always desirable to prevent such fires. In the States above mentioned Federal forest officers receive the needed State authority on State lands adjacent to the Forests, but no provision is made for reimbursing the Government for expenses incurred in the protection of such State lands. Should such provision be made by the States, so as to permit National Forest officers acting as State firewardens to incur such expenses as may now be incurred by other State firewardens, the cooperative

arrangement would be yet more advantageous than it now is for both State and National forests.

(7) Provision for the taxation of forest owners on an acreage basis, the fund so raised to be devoted to forest patrol. This plan is successfully followed in Nova Scotia, and a law containing similar provisions was introduced last winter in the legislature of Wisconsin.

THE PROMOTION OF FORESTRY.

State laws to encourage forestry have thus far been chiefly of two kinds: Those creating forest commissions and, of late, State foresters, and those offering inducements, in the form of bounties or exemption from taxes, to plant forest trees or to maintain forests. The latter have had some slight educational value, but they have in most cases been poorly framed and they have usually been declared unconstitutional. They have led neither to the planting nor to the preservation of forests. The State forest commissions and State foresters, on the other hand, have very greatly advanced the cause of forestry by gathering and distributing information, advising the Government or legislature of the State, and cooperating with private forest owners in the care of forest tracts and woodlots and in the establishment and care of forest plantations.

Cooperation with private owners in forest management and forest planting is of paramount importance. The private owners must be met on their own ground. Until the resources of real cooperation are exhausted it is not time to consider measures for bringing forestry to pass by drastic legislation.

Forest taxation is one of the insistent problems involved in the encouragement of forestry by the State. At present private forests are in many cases practically taxed out of existence. Our forests are doubly discriminated against in the tax laws: First, because they belong to the class of real property, which is already overburdened, and, second, because they are assessed on the basis of sale value instead of on the basis of income. Such a state of affairs encourages reckless cutting, after which the devastated forest is too commonly allowed to revert to the State.

Public sentiment has been awakened to the need of a substitute for the general property tax as applied to forest lands. Economists have for years recognized the fact that the burden to which such lands are subject under present tax systems is very unjust, and desultory attempts have been made to effect a remedy. As was said, these attempts, which have usually taken the form of partial or entire exemption of forests from taxation, of rebates of taxes, or of bounties to the owners, have not been very successful.

In the autumn of 1907 the whole subject was brought into the field of general public thought by the International Tax Association

at its first conference held at Columbus, Ohio, when forest taxation was given a separate place among the topics for consideration. At the second meeting of the association, held at Toronto, Canada, one year later, a scientific and just method of forest taxation was first well presented, and the principles then laid down have, with some variation, been since embodied in laws proposed in several of the State legislatures.

The principles recommended by the Forest Service can not be generally adopted without amendment to the constitution of a great many of the States, but it seems as if the growing public interest in this whole subject will compel such amendments and thus open the way for a system of forest taxation which will be just and which will encourage the holding of cut-over lands for reforestation and another crop. Indeed, in two of the States, Minnesota and Oregon, steps have already been taken to this end, for in each of these States a constitutional amendment has been submitted to the legislature which will permit the taxation of timberlands according to approved principles.[a]

In the following table are given the names of the States having fire-protective systems or general forest organizations, or both, and the names and addresses of the executive heads:

State forest officers.

State or Territory.	Name and post-office.	Official position.
Alabama	John H. Wallace, jr., Montgomery	Commissioner, department of game and fish.
California	Gerard B. Lull, Sacramento	State forester.
Connecticut	Walter H. Filley, New Haven	Do.
Hawaii	Ralph S. Hosmer, Honolulu	Superintendent of forestry.
Indiana	W. H. Freeman, Indianapolis	Secretary State board of forestry.
Kansas	Henry Cooper, Dodge City	Commissioner of forestry.
	F. H. Ridgway, Ogallah	Do.
Kentucky	M. C. Rankin, Frankfort	Chairman State board of agriculture forestry, and immigration.
Louisiana	A. W. Crandell, Baton Rouge	State forest commissioner.
Maine	Edgar E. Ring, Augusta	Land agent and forest commissioner.
Massachusetts	F. Wm. Rane, Boston	State forester.
Maryland	F. W. Besley, Baltimore	Do.
Michigan	Huntley Russell, Lansing	Secretary forestry commission.
	Filibert Roth, Ann Arbor	State forest warden.
Minnesota	Gen. C. C. Andrews, St. Paul	Secretary State forestry board and forestry commissioner.
New Hampshire	R. E. Faulkner, Keene	Secretary forest commission.
New Jersey	Alfred Gaskill, Trenton	Secretary forest park reservation commission, and forester.
New York	James S. Whipple, Albany	Commissioner forest, fish, and game commission.
	Wm. F. Fox, Albany	Superintendent of State forests.
	C. R. Pettis	State forester.
North Carolina	Joseph H. Pratt, Chapel Hill	State geologist.
Ohio	Wm. G. Green, Wooster	Forester, State agricultural experiment station.
Oregon	J. W. Baker, Cottage Grove	Forestry, fish, and game warden.
	E. P. Sheldon, Portland	Secretary forestry commission.
Pennsylvania	Robert S. Conklin, Harrisburg	Commissioner of forestry.
	George H. Wirt, Mont Alto	Chief forester.

[a] Recent publications on the subject of forest taxation are as follows:
The Economic Problem of Forest Taxation, by Prof. Fred R. Fairchild, in the Yale Review of February, 1909.
Forest Taxation, a pamphlet published by the International Tax Association, Columbus, Ohio, giving the addresses and discussion on this subject before the international conference at Toronto, Canada, in October, 1908.
A pamphlet on the Taxation of Timberlands and the Future Timber Supply, by E. G. Scammon.

State forest officers—Continued.

State or Territory.	Name and post-office.	Official position.
Rhode Island	Jesse B. Mowry, Chepatchet	Commissioner of forestry.
Vermont	Austin F. Hawes, Randolph	State forester.
Washington	R. W. Condon, Port Gamble	Chairman State board of forest commissioners.
	J. R. Welty, Olympia	State firewarden and forester.
West Virginia	I. C. White, Morgantown	State geologist.
Wisconsin	Edward M. Griffith, Madison	State forester.

STATE FORESTS.

The following table shows the area and location of existing State forests:

Area and location of State forest reserves.

State.	Name and location.	Area.	Total area.
		Acres.	*Acres.*
Connecticut	Portland tract, Middlesex County	1,060	
	Union tract, Tolland County	300	
			1,360
Hawaii	Halelea, Kauai	37,500	
	Kealia, Kauai	9,935	
	Na Pali-Kona, Kauai	60,540	
	Kapaipau, Oahu	913	
	Ewa, Oahu	28,550	
	Waianae-kai, Oahu	3,257	
	Lualualei, Oahu	3,743	
	Koolau, Maui	42,969	
	Haua, Maui	14,825	
	West Maui, Maui	44,440	
	Makawao, Maui	1,796	
	Hamakua Pali, Hawaii	18,990	
	Hilo, Hawaii	110,000	
	Honuaula, Hawaii	665	
	Kau, Hawaii	65,850	
	Waiaha Spring, Hawaii	193	
			[a] 443,166
Indiana	State reservation, Clark County	2,000	
			2,000
Maryland	State reserve, Garrett County	3,500	
	State reserve, Baltimore County	40	
			3,540
Massachusetts	Scattered	1,000	
			1,000
Michigan	State reserve, Roscommon and Crawford counties	39,000	
			39,000
Minnesota	Burntside Forest, St. Louis County	20,000	
	Pillsbury tract, Cass County	1,000	
	Itasca State Park, Clearwater, Becker, and Hubbard counties	22,297	
			43,297
New Hampshire	Gift of Miss Frances A. L. Haven, Jaffrey	60	
			60
New Jersey	Mays Landing tract, Atlantic County	378	
	Bass River tract, Burlington County	2,593	
	Blairstown tract, Warren County	555	
	Kittatinny Mountain Reserve	5,432	
			8,958
New York	Adirondack Preserve, Clinton, Essex, Franklin, Fulton, Hamilton, Herkimer, Lewis, Oneida, St. Lawrence, Saratoga, Warren, and Washington counties	1,500,626	
	Catskill Preserve, Delaware, Green, Sullivan, and Ulster counties	111,191	
			1,611,817
Pennsylvania	State reserves, Adams, Bedford, Cameron, Center, Clearfield, Clinton, Cumberland, Dauphin, Elk, Franklin, Fulton, Huntingdon Juniata, Lackawanna, Lycoming, Mifflin, Monroe, Pike, Potter, Snyder, Tioga, Union, and Wyoming counties	863,000	
			863,000
Wisconsin	Forest reserves, Ashland, Bayfield, Burnett, Douglas, Florence, Forest, Iron, Langlade, Lincoln, Marinette, Oneida, Polk, Price, Rusk, Sawyer, Vilas, and Washburn counties	253,573	
			253,573
	Grand Total		3,270,771

[a] Of this total 61 per cent is Government land.

These State forests represent a line of State action which has been preeminently successful. As the table shows, New York leads the States in State forest area, followed by Pennsylvania and Wisconsin. The smaller attempts of Minnesota, Michigan, Connecticut, Massachusetts, New Jersey, Indiana, etc., are all important. The State forests speak for themselves. First, they furnish object lessons of great value; second, they form the nucleus of what some day must be the principal center of State forest work. It is a fundamentally sound policy for the State to own land, especially land which does not offer the conditions necessary for prosperous settlement.[a]

PRIVATE FORESTRY.

THE INDUCEMENT TO PRACTICE FORESTRY.

Three-fourths of all our forests are in private hands. These private forests are, moreover, the best stocked; they contain four-fifths of all the timber in the country. Clearly the bulk of the timber cut must come, for some time at least, from this area. Upon the use of the forest growing upon it will depend whether future demands for timber will be met or not. Very largely, therefore, the forest problem is to be solved by private forestry—unless, indeed, private owners fail to practice it on any considerable scale, in which case public ownership may be invoked in the public interest. It is of the greatest importance, then, to know the extent to which forestry is now, and is likely to be, practiced on private lands.

The area of private forest on which forestry is practiced at present is not known and can only be roughly estimated. Probably it is less than 1 per cent of the total area of private forests. As was said in describing the cooperative work of the Forest Service, about 10,000,000 acres have been involved in the applications made to the Service for advice in proper forest management. Actual work in accordance with Service advice has been done on a substantial part of the area. In but few cases, however, have complete working plans been persistently carried out. The chief value of this work has been its educational effect, which extends far beyond the forests directly concerned. A valuable result thus secured is the better general knowledge of the meaning and aims of forestry. Forestry is now correctly understood to mean no mere sentimental plea for regarding the forest as an ornament to the landscape, but a practical plan for getting the best economic service out of the forest in the

[a] Government publications dealing with State forestry are: The Progress of Forestry in 1907; The Progress of Forestry in 1908; What the States Should Do to Perpetuate the Forests, by Filibert Roth. (The latter is part of the report of the National Conservation Commission, which is published as Senate document No. 676, and can be obtained only through Members of Congress.)

long run. This is a great advance. With forestry rightly understood, it is a comparatively simple matter to work out the results which the practice of forestry may be expected to secure.

It is, of course, both useless and unfair to invite forest owners to practice forestry simply for pleasure. In dealing with public forests the first consideration is the public welfare; in dealing with private forests the first consideration is the business inducement. Forests in private hands are realty investments made for the interest they will produce. Their owners are chiefly concerned with knowing what will happen to the investment, how its interest-yielding power will be affected under the conservative management which the forester recommends. If forestry is not good business, then good business men, such as most forest owners unquestionably are, are precisely the sort of men not to touch it.

In the past almost the exclusive inducement to invest in forest property has been the chances it offered for clearing up and closing out at a satisfactory profit—a quick and remunerative turnover of capital. This sort of investment has been, and to a greatly limited extent still is, highly profitable. It is distinctive of the lumber industry. It will continue to characterize transactions in timber land as long as it pays better to skin the land and move on than it does to develop the land and hold on. It has become a business habit, which fact makes it all the harder to change. In order, however, for forestry to come into general practice, a change will have to come.

Speculative deals in forest property, buying in cheap in order to sell out at an advance, can go on only as long as it remains comparatively easy to get in and out of the market quickly; that is, only as long as first-class stumpage can be readily picked up. Cheap virgin forest is getting scarce, and stumpage prices, which so long have lagged behind lumber prices, are rising sharply. The opportunities for forest speculation in the old style are fewer every day.

Realizing this situation better than anybody else, lumbermen and others owning and dealing in forest lands are beginning to ask whether it is not time to handle forest properties in a different way—to hold them and put them on a permanent paying basis by utilizing the productive power of the forest, together with the advance in stumpage values; in short, whether forestry will not pay better than exploitation.

A satisfactory answer to the question "Will forestry pay?" can not be made offhand The problem is not one of theory, but one of conditions; the considerations involved are not absolute, but relative. The point to decide is not whether forests in general and anywhere can, by intensive forestry, be made to yield net profits indefinitely, but whether private forests in the United States, at present and

prospective market prices for stumpage and forest products, in the present state of the lumber industry, under existing laws, and with the prevailing public sentiment toward the forest, can, under more conservative management, be made to yield an interest rate satisfactory to investors as compared with the profits of forest devastation. The lumberman and the forest owner are facing a real situation of concrete facts, and the forester's answer to their question must be no less concrete.

OBSTACLES TO PRIVATE FORESTRY.

Getting right down to the situation as it comes home to the forest owner and the lumberman, it is easy to see that there are certain obstacles in the way which must be overcome before it is reasonable to expect that private forestry will be widely practiced. The chief of these are the following:

THE GREAT FIRE RISK.

While the private owner should unquestionably be required to contribute toward the protection of his own holdings from fire, he can hardly be expected to assume the whole expense in a country where the general sentiment toward fires is indifferent. The most effective fire protection anywhere outside of the State and National forests is secured now in the States of Oregon, Washington, and Idaho by cooperative fire associations which assess their members on an acreage basis and maintain a patrol. During the past year such associations cooperated successfully with the protective force maintained by the National Government and the States. Investigations show that patrol can accomplish full protection to forest land at an annual cost of from 2 to 4 cents per acre throughout the United States, according to the regional fire risk. The total annual cost of protecting all private forests is estimated at $10,000,000. The annual fire losses in standing timber alone are placed at $50,000,000.

ILL-DEVISED TAXATION.

In a real sense, forests are in many cases simply taxed out of existence. As long as forests continue to be taxed on the basis of an annual crop, holding young forests until they reach maturity, and, still more, the establishment of new forests, means financial loss to anyone who attempts it. Such methods of taxation are in the end ruinous to the community also, for they encourage devastation and the abandonment to the State of lands which thereafter yield no revenue in the form either of products or of taxes. (See State Forestry, p. 18.)

By suitable legislation the State can remove both of these obstacles now in the way of private forestry. They are artificial obstacles.

CHEAP STUMPAGE PRICES.

Cheap stumpage is the chief natural obstacle to the wide extension of private forestry. Forestry involves an investment in growing timber. If the investment is to show a satisfactory profit, the product must not sell too cheap. As long as the product sells cheap, expenditures will not be made to produce it, and the timberman will continue to be the nomad and the speculator which past conditions have inevitably made him. In order to hold out inducements to private enterprise, forestry must offer a reasonable margin of profit above the cost of growing the timber.

This obstacle to forestry is being steadily removed by the depletion of the virgin forests and the consequent rise in stumpage prices. Already, as the following examples show, the scarcity of supplies has resulted in a number of cases in the holding of tracts for more than a single crop.

EXAMPLES OF PRIVATE FORESTRY.

The heavy loss from fire has led to the greatest progress thus far made toward the practice of forestry on private lands. In Oregon, Washington, and Idaho large tracts have been placed under organized protection by associations of timber-land owners, each member of which pays pro rata toward the cost. For example, the four fire protective associations of northern Idaho expended for fire protection in 1908 $52,284.11, protecting directly 1,257,787 acres of forest owned by members, and incidentally large areas of adjoining forest. The average cost of this protection, including fire fighting, was a little over 4 cents per acre. One of the associations, however, lost far more heavily than the rest, owing principally to incomplete patrol. Three of the associations protected their holdings at a cost, respectively, of 3 cents, 2⅛ cents, and 2⅝ cents per acre. The reports of the associations show that the main emphasis was laid upon patrol. Thus one association apportioned its expenditures as follows:

	Per cent.
Patrol	49.23
New trails	16.98
Cleaning old trails	12.98
Fire fighting	10.57
All other items	10.24

Next to patrol the chief expense was trail building, which in the above case was 29.96 per cent of the total protection cost. Provision was made for tool boxes at convenient places, for tools, and for horses, as well as for lookout stations.

Equally successful results have not yet been achieved over large areas of private forest lands by either individual or associated efforts

in other parts of the country. But numerous small tracts in the East and South are now fairly well protected at moderate cost, and the owners report satisfactory recuperation and reproductions on the protected areas. A case worth special mention is that of an owner in the south-central region, a cooperator with the Forest Service, who is applying a working plan in the management of large holdings. Difficulty was found in keeping fires out of the cut-over land, owing to the carelessness of neighboring settlers. An experiment was therefore made by the owner. A tract of 1,000 acres was set aside and given special protection. Fires have been kept out of this tract for five years, and the owner finds that full reproduction is now the reward of his efforts. Where the business wisdom of protecting a large tract is in doubt, such a test may well be tried. It is not costly, and the results speak for themselves. In most cases an object lesson of this sort, driving home the truth about fire protection, will convince the forest owner that he can not afford fires.

At Corbin Park, in central New Hampshire, some 17,000 acres of forest have been carefully lumbered on the selection plan for five years, in accordance with a working plan made by the Forest Service. The park is intended mainly for a game preserve, and all forest work is arranged with respect to its effect upon the game. Nevertheless, the revenue derived from the sale of live game and of forest products more than covers the expense of management and yields a satisfactory profit on the investment, while the future forest crop is steadily coming on.

On one of the larger private estates on the Hudson forestry is well practiced. The property, which embraces 1,000 acres, has about 300 acres under forest, from which cordwood from improvement cuttings sells well in the local market. Good roads and the easy accessibility of the tract make it possible to handle the forest in this way as profitably as if large clear fellings were made, so that the maximum financial yield is secured with the minimum of disturbance to forest conditions. Where the stand is sparse planting is done, and the stock is raised in a forest nursery upon the estate. This is another example of what can be done by forestry. The methods employed and the results secured are of great educational value to the whole community, where many opportunities of similar management offer.

That good management pays is strikingly shown by the experience of the University of the South, at Sewanee, Tenn. In 1900 the university undertook to manage its 7,000 acres of forest in accordance with recommendations made by the Forest Service. Immediate financial returns were desired, while expenditures for improvement were not permitted. In 1899 the university had considered

an offer of $3,000 for the merchantable timber, and regarded it favorably. At the time the working plan was made fires were injuring the forest by burning away the humus and damaging the timber. The plan recommended took into consideration the probable rise in local stumpage values, and embraced a series of fellings instead of an immediate sale of the whole merchantable stand. Since the plan went into effect the sum of $18,101.76 above all expenses has been received from the sale of timber. Meantime, fire has been controlled, and excellent reproduction is the result, so that the perpetuation of the forest is assured.

Among those private owners of forests who themselves make use of the timber produced, a number practice forestry in order to secure permanent supplies. Conspicuous among these are wood-pulp and paper manufacturers, who largely own the forests from which they get their logs. These are in many cases limiting the cut to what the forest grows each year, thus insuring a sustained yield permanently. They also safeguard the forest by efficient fire protection. Of this the chief feature is patrol. Where their present holdings are too small to satisfy their annual demands, these owners are buying new tracts to secure the requisite growing stock.

A Connecticut water company furnished another example of forestry. In this case forestry was undertaken mainly because of its value as a means of increasing the purity of the water. But though forest growth was needed on the reservoir catchment basin primarily as a protective cover, it was seen that this protection forest might safely be made to produce also a yield of wood. Accordingly the existing forest was placed under a conservative plan of management. The stand is perpetuated and improved, and also produces an annual yield of cordwood, posts, and cross-ties. Open ground is being planted to a commercial forest, while around the reservoirs protective belts of conifers are being set out to protect the water from pollution and improve the scenic beauty of the property. Several other water companies are practicing forestry along substantially the same lines.

In point of variety and scope the work done on the Biltmore estate, in North Carolina, is remarkable. The forests, which cover 130,000 acres, are made self-sustaining by the production of various forms of material. Four million feet of lumber, 5,000 cords of tannic-acid wood and fuel, a thousand cords of tan bark, and several hundred cords of pulp wood are cut every year. At the same time the forest itself is steadily increasing in value. Workmen employed along the boundaries of the forest do duty as fire guards. Thus fire protection is secured at least throughout all the accessible parts of the tract.

In connection with all lumbering operations permanent logging roads are built. These minimize the present cost of transportation, and will greatly reduce the cost of marketing future crops. Thus the extension of the roads is steadily adding to the investment value of the forest. Moreover, they serve also as a network of fire lines. Forest planting is practiced where fire will not threaten its success. The experimental work in silviculture which is done at Biltmore is certain to make important additions to the science and practice of forestry.

Since extensive forest planting is to be expected only when the conditions surrounding forestry are far more stable and advantageous than they are at present in most parts of the country, it is not surprising that it has as yet scarcely been attempted by private owners. What forest planting has been done on private lands is mainly the result of artificial encouragement, by the Federal timber-culture laws, now repealed, or by bounties or tax exemptions offered by the States. The bounty and exemption laws are, as a rule, unsatisfactory in their results, and the forest area of the country has not been much extended by this means. The total area of planted forest land does not exceed 965,000 acres. Yet the total area of land which would yield its greatest returns from planted forest is more than 56,000,000 acres.

In New England forest planting has been particularly successful, and is now being done on an increasing scale. Not including old plantations that have been cut, approximately 25,000 acres have been planted, and it is estimated that 5,000,000 board feet of white pine and 34,000 feet of hardwoods could be harvested to-day from plantations in New England. From the trees that were planted in 1908 about 60,000,000 feet can be obtained when the plantations become merchantable.

Realizing the advantage of an assured future timber supply, several railroads are adding to their forest holdings and managing their forest properties for the production of a sustained yield of cross-ties for their own roads. The success and economy of preservative treatment now make it possible to use for cross-ties woods that are cheaper and more abundant than the woods of longer life. By their recent purchases of tracts of loblolly pine the railroads are showing their appreciation of this fact. The practice of forestry by the railroads is therefore especially significant, in that it includes, in addition to conservative management, the commercial utilization of timbers of lower grade. In a number of cases planting is done, also with a view to tie production, though such planting is usually a subordinate part of the forest policy.

As widely scattered illustrations of what private forestry may do and is beginning to do, these concrete examples are noteworthy. But as progress toward the general practice of forestry by private owners, their total amount is altogether insignificant.[a]

Approved:

JAMES WILSON,
Secretary of Agriculture.

WASHINGTON, D. C., *May 29, 1909.*

[a] Publications of the U. S. Department of Agriculture dealing with private forestry are: Farmers' Bulletins 173 and 358, A Primer of Forestry; Forest Service Circular 25, Forestry and the Lumber Supply; Forest Service Circular 131, Practical Forestry on a Spruce Tract in Maine. (See also the list in the Appendix under "Forest Management.")

APPENDIX.

CLASSIFIED LIST OF PUBLICATIONS OF THE FOREST SERVICE.

Application for any of the publications named in the following list, except those marked (*), may be made to the Forester, United States Department of Agriculture, Washington, D. C.

A star (*) indicates that there is no supply at the disposal of the Forest Service, and that the document can be obtained only by purchase. Remittance should be made by postal money order (stamps not accepted) or New York exchange directly to the Superintendent of Documents, Government Printing Office, Washington, D. C. Coin is sent at the sender's risk.

GENERAL.

*Bulletin 24. A Primer of Forestry, in two parts. Part I—The Forest. (Out of print.) Part II—Practical Forestry. (Price 30 cents.)
*Bulletin 57. Federal and State Forest Laws. (Price 15 cents.)
Farmers' Bulletin 173. A Primer of Forestry (paper). A reprint of Bulletin 24, Part I.
Farmers' Bulletin 358. A Primer of Forestry (paper). A reprint of Bulletin 24, Part II.
Farmers' Bulletin 340. Declaration of Governors for Conservation of Natural Resources.
Farmers' Bulletin 327. The Conservation of Natural Resources.
Circular 23. Suggestions to Prospective Forest Students.
Circular 35. Forest Preservation and National Prosperity.
Circular 96. Arbor Day.
Circular 116. The Waning Hardwood Supply.
Circular 130. Forestry in the Public Schools.
Circular 140. What Forestry Has Done.
Circular 159. The Future Use of Land in the United States.
Circular 166. The Timber Supply of the United States.
Circular 167. The Status of Forestry in the United States (this Circular).
Annual Reports of the Forester for 1892, 1901, 1902, 1903, 1905, 1907, and 1908.
Extracts from Yearbooks of the Department of Agriculture:
434. The National Forests and the Lumber Supply (1906).
466. Cutting Timber on the National Forests and Providing for a Future Supply (1907).
470. Progress of Forestry in 1907 (1907).

NATIONAL FORESTS.

Bulletin 54. The Luquillo Forest Reserve, Porto Rico.
The Use Book: Regulations and Instructions for the Use of the National Forests.
The Use of the National Forests.

FORESTS AND STREAM FLOW.

*Bulletin 44. The Diminished Flow of the Rock River in Wisconsin and Illinois, and Its Relation to the Surrounding Forests. (Price 10 cents.)
*Bulletin 49. The Timber of the Edwards Plateau of Texas. (Price 10 cents.)
Extract 329, from the Yearbook of the Department of Agriculture (1903): The Relation of Forests to Stream Flow.
Senate Document 91. Report of the Secretary of Agriculture on the Southern Appalachian and White Mountain Watersheds.
Circular 143. The Relation of the Southern Appalachian Mountains to Inland Water Navigation.
Circular 144. The Relation of the Southern Appalachian Mountains to the Development of Water Power.

FOREST FIRES.

Circular 26. Forest Fires in the Adirondacks in 1903.
Circular 79. The Control of Forest Fires at McCloud, California.

FORESTRY AND LUMBERING.

*Bulletin 34. A History of the Lumber Industry in the State of New York. (Price 20 cents.)
Bulletin 36. The Woodsman's Handbook.
*Bulletin 61. Terms Used in Forestry and Logging. (Price 5 cents.)
*Bulletin 71. Rules and Specifications for the Grading of Lumber. (Price 15 cents.)
*Bulletin 73. Grades and Amount of Lumber Sawed from Yellow Poplar, Yellow Birch, Sugar Maple, and Beech. (Price 10 cents.)
Circular 25. Forestry and the Lumber Supply.
Circular 113. Use of Dead Timber in the National Forests.
Circular 127. Forest Tables—Western Yellow Pine.
Extract 274. Influence of Forestry upon the Lumber Industry.
Extract 398, from Yearbook of the Department of Agriculture: Waste in Logging Southern Yellow Pine (1905).

FOREST MANAGEMENT.

*Bulletin 26. Practical Forestry in the Adirondacks. (Price 15 cents.)
Bulletin 30. A Forest Working Plan for Township 40, Hamilton County, New York.
*Bulletin 32. A Working Plan for Forest Lands near Pine Bluff, Arkansas. (Price 15 cents.)
*Bulletin 39. Conservative Lumbering at Sewanee, Tennessee. (Price 15 cents.)
*Bulletin 43. A Working Plan for Forest Lands in Hampton and Beaufort Counties, South Carolina. (Price 15 cents.)
*Bulletin 56. A Working Plan for Forest Lands in Berkeley County, South Carolina. (Price 10 cents.)
*Bulletin 60. Report on an Examination of a Forest Tract in Western North Carolina. (Price 5 cents.)
*Bulletin 68. A Working Plan for Forest Lands in Central Alabama. (Price 10 cents.)
Circular 118. Management of Second Growth in the Southern Appalachians.
Circular 131. Practical Forestry on a Spruce Tract in Maine.
Circular 149. Condition of Cut-Over Longleaf Pine Lands in Mississippi.
Circular 165. Practical Assistance to Owners of Forest Land and to Tree Planters.
Extract 249, from Yearbook of the Department of Agriculture: A Working Plan for Southern Hardwoods and Its Results (1901).

CARE OF THE WOODLOT.

Bulletin 42. The Woodlot.
Circular 138. Suggestions to Woodlot Owners in the Ohio Valley Region.

FOREST STATISTICS.

*Bulletin 77. Forest Products of the United States: 1906. (Price 15 cents.)
Circular 49. Timber Used in the Mines of the United States in 1905.
Census Bulletins:
Poles Purchased, 1907.
Pulp Wood Consumption, 1907.
The Lumber Cut of the United States, 1907.
Production of Slack Cooperage Stock, 1907.
Consumption of Tanbark and Tanning Extracts, 1907.
Wood Consumed in Veneer Manufacture, 1907.
Production of Tight Cooperage Stock, 1907.
Wood Distillation, 1907.
Cross-ties Purchased, 1907.
Production of Lumber, Lath, and Shingles, 1907.
Circular 155. Production and Consumption of Basket Willows in the United States for 1906 and 1907.
Circular 162. Exports and Imports of Forest Products, 1908.

GRAZING.

*Bulletin 62. Grazing on the Public Lands. (Published also in the second partial report of the Public Lands Commission, Senate Document No. 189, 58th Cong., 3d sess.) (Price 15 cents.)
Bulletin 72. Wolves in Relation to Stock, Game, and the National Forest Reserves. (Price 10 cents.)
Circular 156. Preliminary Report on Grazing Experiments in a Coyote-proof Pasture.
Circular 158. The Revegetation of Overgrazed Range Areas.
Circular 160. The Coyote-Proof Pasture Experiment, 1908.
Circular 169. The Natural Revegetation of Depleted Mountain Grazing Lands.

FOREST PLANTING.

*Bulletin 45. The Planting of White Pine in New England. (Price 20 cents.)
*Bulletin 65. Advice for Forest Planters in Oklohoma and Adjacent Regions. (Price 5 cents.)
Bulletin 76. How to Grow and Plant Conifers in the Northeastern States.
Circular 37. Forest Planting in the Sand-Hill Region of Nebraska.
Circular 41. Forest Planting on Coal Lands in Western Pennsylvania.
Circular 45. Forest Planting in Eastern Nebraska.
Circular 81. Forest Planting in Illinois.
Circular 96. Arbor Day.
Circular 99. Suggestions for Forest Planting on the Semi-Arid Plains.
Circular 100. Suggestions for Forest Planting in the Northeastern and Lake States.
Circular 109. Forest Planting in the North Platte and South Platte Valleys.
Circular 145. Forest Planting on the Northern Prairies.
Circular 154. Native and Planted Timber of Iowa.
Circular 161. Forest Planting in Western Kansas.
Circular 165. Practical Assistance to Owners of Forest Land and to Tree Planters. Supersedes Circulars 21 and 22.

Farmers' Bulletin 134. Tree Planting on Rural School Grounds.
Farmers' Bulletin 228. Forest Planting and Farm Management.
Extracts from Yearbooks of the Department of Agriculture:
212. Forest Extension in the Middle West (1900).
376. How to Grow Young Trees for Forest Planting (1905).

FOREST-PLANTING LEAFLETS (CIRCULARS 54–77, 82–95, AND 106).

54. How to Cultivate and Care for Forest Plantations on the Semi-Arid Plains.
55. How to Pack and Ship Young Forest Trees.
56. Bur Oak.
57. Jack Pine.
58. Red Oak.
59. Eucalypts. (Revised Edition.)
60. Red Pine.
61. How to Transplant Forest Trees.
62. Shagbark Hickory.
63. Basswood.
64. Black Locust. (Revised Edition.)
65. Norway Spruce.
66. White Elm.
67. White Pine.
68. Scotch Pine.
69. Fence-Post Trees.
70. European Larch.
71. Chestnut.
72. Western Yellow Pine.
73. Red Cedar.
74. Honey Locust.
75. Hackberry.
76. Silver Maple.
77. Cottonwood.
82. Hardy Catalpa.
83. Russian Mulberry. (Revised Edition.)
84. White Ash.
85. Slippery Elm.
86. Boxelder.
87. White Willow.
88. Black Walnut.
89. Tamarack.
90. Osage Orange.
91. Coffeetree.
92. Green Ash.
93. Yellow Poplar.
94. Black Cherry.
95. Sugar Maple.
106. White Oak.

FOREST STUDIES.

*Bulletin 47. Forest Resources of Texas. (Price 15 cents.)
*Bulletin 48. The Forests of the Hawaiian Islands. (Price 10 cents.)
*Bulletin 49. The Timber of the Edwards Plateau of Texas. (Price 10 cents.)
*Bulletin 55. Forest Conditions of Northern New Hampshire. (Price 25 cents.)
*Bulletin 63. The Natural Replacement of White Pine on Old Fields in New England. (Price 10 cents.)
*Bulletin 66. Forest Belts of Western Kansas and Nebraska. Price 10 cents.)

COMMERCIAL TREE STUDIES.

*Bulletin 13. The Timber Pines of the Southern United States. (Price 35 cents.)
*Bulletin 31. Notes on the Red Cedar. (Price 10 cents.)
*Bulletin 33. The Western Hemlock. (Price 20 cents.)
*Bulletin 35. Eucalypts Cultivated in the United States. (Price $1.)
*Bulletin 37. The Hardy Catalpa. (Price 25 cents.)
*Bulletin 38. The Redwood. (Price 20 cents.)
*Bulletin 53. Chestnut in Southern Maryland. (Price 10 cents.)
*Bulletin 58. The Red Gum (Revised Edition). (Price 5 cents.)
*Bulletin 64. Loblolly Pine in Eastern Texas. (Price 5 cents.)
*Bulletin 69. Sugar Pine and Western Yellow Pine in California. (Price 10 cents.)
Circular 102. Production of Red Cedar for Pencil Wood.
Circular 105. White Oak in the Southern Appalachians.
Circular 135. Chestnut Oak in the Southern Appalachians.
Circular 150. Douglas Fir.
Circular 163. Paper Birch in the Northeast.
Circular 164. The Properties and Uses of Southern Pines.
Circular 168. The Commercial Importance of the White Mountain Forests.

FOREST, BOTANICAL, AND DENDROLOGICAL STUDIES.

*Bulletin 17. Check List of the Forest Trees of the United States. (Price 15 cents.)
*Bulletin 28. A Short Account of the Big Trees of California. (Price 15 cents.)
Bulletin 40. A New Method of Turpentine Orcharding.
*Bulletin 59. The Maple Sugar Industry. (Price 5 cents.)
Circular 34. Practical Results of the Cup and Gutter System of Turpentining.
Circular 148. Practical Results in Basket Willow Culture.
Farmers' Bulletin 252. Maple Sugar and Sirup.
Farmers' Bulletin 341. The Basket Willow.

PHYSICAL PROPERTIES, SEASONING, AND PRESERVATIVE TREATMENT OF TIMBER.

*Bulletin 6. Timber Physics, Part I; Preliminary Report. (Price 10 cents.)
*Bulletin 8. Timber Physics, Part II; Progress Report. (Price 15 cents.)
*Bulletin 10. Timber: An Elementary Discussion of the Characteristics and Properties of Wood. (Price 10 cents.)
*Bulletin 41. Seasoning of Timber. (Price 25 cents.)
*Bulletin 50. Cross-Tie Forms and Rail Fastenings, with Special Reference to Treated Timbers. (Price 15 cents.)
*Bulletin 51. Report on the Condition of Treated Timbers Laid in Texas, February, 1902. (Price 5 cents.)
*Bulletin 70. Effect of Moisture upon the Strength and Stiffness of Wood. (Price 15 cents.)
Circular 15. Summary of Mechanical Tests on Thirty-two Species of American Woods.
Circular 39. Experiments on the Strength of Treated Timber.
Circular 40. The Utilization of Tupelo.
Circular 46. Holding Force of Railroad Spikes in Wooden Ties.
Circular 47. Strength of Packing Boxes of Various Woods.
Circular 48. Kiln-Drying Hardwood Lumber.
Circular 80. The Fractional Distillation of Coal-Tar Creosote.
Circular 98. Quantity and Character of Creosote in Well-Preserved Timbers.
Circular 101. The Open-Tank Method for the Treatment of Timber.
Circular 103. Seasoning of Telephone and Telegraph Poles.
Circular 104. Brush and Tank-Pole Treatments.
Circular 108. Strength of Wood as Influenced by Moisture.
Circular 111. Prolonging the Life of Mine Timbers.
Circular 112. The Analysis and Grading of Creosotes.
Circular 114. Wood Distillation.
Circular 115. Second Progress Report on the Strength of Structural Timber.
Circular 117. The Preservative Treatment of Fence Posts.
Circular 128. Preservation of Piling against Marine Wood Borers.
Circular 132. The Seasoning and Preservative Treatment of Hemlock and Tamarack Cross-Ties.
Circular 134. The Estimation of Moisture in Creosoted Wood.
Circular 136. The Seasoning and Preservative Treatment of Arborvitæ Poles.
Circular 139. A Primer of Wood Preservation.
Circular 141. Wood Paving in the United States.
Circular 142. Tests of Vehicle and Implement Woods.
Circular 146. Experiments with Railway Cross-Ties.
Circular 147. Progress in Chestnut Pole Preservation.
Circular 151. The Preservative Treatment of Loblolly Pine Cross-Arms.
Circular 152. The Analysis of Turpentine by Fractional Distillation with Steam.

Circular 164. The Properties and Uses of Southern Pines.
Extract 395, from Yearbook of the Department of Agriculture; Prolonging the Life of Telephone Poles (1905).

FOREST MAPS.

Wall map of the United States (5×7 ft.) showing National Forests and related projects and data (July 1, 1908). (Price 25 cents.)
*Wall map of the United States (5×7 ft.) showing distribution of forest and woodland (March 17, 1908). (Price 50 cents.)
Forest Service Atlas, statistics 1907. (Price 50 cents.)
Instructions for making Forest surveys and maps.
Table showing locations and areas of the National Forests.
Index map of National Forests (21×33) (July 1, 1909).

LOCATION AND AREA OF THE NATIONAL FORESTS IN THE UNITED STATES, ALASKA, AND PORTO RICO, AND DATES WHEN LATEST PROCLAMATIONS BECAME EFFECTIVE.

State or Territory.	Forest.	Headquarters of supervisor.	Proclamation effective.	Area.	Total.
				Acres.	*Acres.*
Arizona	Apache	Springerville	Mar. 2, 1909	1,785,711	
	Chiricahua [a]	Douglas	July 2, 1908	287,520	
	Coconino	Flagstaff	July 2, 1908	3,689,982	
	Coronado	Benson	July 2, 1908	966,368	
	Crook	Safford	July 1, 1908	788,624	
	Dixie [b]	St. George, Utah	Feb. 10, 1909	626,800	
	Garces	Nogales	July 2, 1908	644,395	
	Kaibab	Kanab, Utah	July 2, 1908	1,080,000	
	Prescott	Prescott	Feb. 1, 1909	1,541,762	
	Sitgreaves	Snowflake	Mar. 2, 1909	1,470,364	
	Tonto	Roosevelt	Feb. 10, 1909	2,110,354	
	Zuñi [c]		Mar. 2, 1909	266,981	
					15,258,861
Arkansas	Arkansas	Mena	Feb. 27, 1909	1,663,300	
	Ozark	Harrison	Feb. 25, 1909	1,526,481	
					3,189,781
California	Angeles	Los Angeles	July 1, 1908	1,350,900	
	California	Willows	Feb. 25, 1909	1,114,904	
	Cleveland	San Diego	Jan. 26, 1909	2,236,178	
	Crater [d]	Medford, Oreg	July 1, 1908	58,614	
	Inyo [e]	Bishop	July 2, 1908	1,458,444	
	Klamath	Yreka	Feb. 13, 1909	2,094,467	
	Lassen	Red Bluff	Mar. 2, 1909	1,373,043	
	Modoc	Alturas	Feb. 25, 1909	1,471,817	
	Mono [f]	Gardnerville, Nev	Mar. 2, 1909	813,789	
	Monterey	Salinas	July 2, 1908	514,477	
	Plumas	Quincy	Mar. 2, 1909	1,407,053	
	San Luis	San Luis Obispo	July 1, 1908	355,990	
	Santa Barbara	Santa Barbara	July 1, 1908	2,027,180	
	Sequoia	Hot Springs, Tulare Co.	Mar. 2, 1909	3,079,942	
	Shasta	Sisson	Mar. 2, 1909	1,754,718	
	Sierra	Northfork	July 2, 1908	1,935,680	
	Siskiyou [g]	Grants Pass, Oreg	July 1, 1908	37,814	
	Stanislaus	Sonora	July 2, 1908	1,117,625	
	Tahoe [h]	Nevada City	Mar. 2, 1909	1,931,042	
	Trinity	Weaverville	Mar. 2, 1909	1,834,833	
					27,968,510
Colorado	Arapaho	Sulphur Springs	July 1, 1908	796,815	
	Battlement [i]	Collbran	July 1, 1908	759,002	
	Cochetopa	Saguache	July 1, 1908	932,890	
	Gunnison	Gunnison	July 1, 1908	945,350	
	Hayden [j]	Encampment, Wyo	July 1, 1908	84,000	
	Holy Cross [k]	Glenwood Springs	Apr. 26, 1909	595,840	

[a] Total of Chiricahua in Arizona and New Mexico=466,497 acres.
[b] Total of Dixie in Arizona and Utah=1,102,665 acres.
[c] Total of Zuñi in Arizona and New Mexico=670,981 acres.
[d] Total of Crater in California and Oregon=1,119,834 acres.
[e] Total of Inyo in California and Nevada=1,521,017 acres.
[f] Total of Mono in California and Nevada=1,349,126 acres.
[g] Total of Siskiyou in California and Oregon=1,302,393 acres.
[h] Total of Tahoe in California and Nevada=1,992,127 acres.
[i] Area of Battlement revised by General Land Office May 27, 1909.
[j] Total of Hayden in Colorado and Wyoming=454,911 acres.
[k] Holy Cross divided into Holy Cross and Sopris National Forests April 26, 1909

Location and area of the National Forests in the United States, Alaska, and Porto Rico, and dates when latest proclamations became effective—Continued.

State or Territory.	Forest.	Headquarters of supervisor.	Proclamation effective.	Area.	Total.
				Acres.	*Acres.*
Colorado	La Sal [a]	Moab, Utah	Mar. 16, 1909	29,502	
	Las Animas [b]	La Veta	Mar. 1, 1907	196,140	
	Leadville	Leadville	July 1, 1908	1,184,730	
	Medicine Bow	Fort Collins	July 1, 1908	659,780	
	Montezuma	Mancos	July 1, 1908	1,175,811	
	Pike	Denver	July 1, 1908	1,457,524	
	Rio Grande	Monte Vista	July 1, 1908	1,262,158	
	Routt	Steamboat Springs	July 1, 1908	1,049,686	
	San Isabel	Westcliffe	July 2, 1908	560,848	
	San Juan	Durango	July 1, 1908	1,460,880	
	Sopris [c]	Aspen	April 26, 1909	655,360	
	Uncompahgre	Delta	July 1, 1908	921,243	
	White River	Meeker	May 21, 1904	970,880	
					15,698,439
Florida	Choctawhatchee		Nov. 27, 1908	467,606	
	Ocala		Nov. 24, 1908	207,285	
					674,891
Idaho	Beaverhead [d]	Dillon, Mont.	July 1, 1908	304,140	
	Boise	Boise	July 1, 1908	1,147,360	
	Cache [e]	Logan, Utah	July 1, 1908	276,640	
	Caribou [f]	Idaho Falls	Jan. 15, 1907	733,000	
	Challis	Challis	July 1, 1908	1,161,040	
	Clearwater	Kooskia	July 1, 1908	2,687,860	
	Coeur d'Alene	Wallace	July 1, 1908	1,543,844	
	Idaho	Elo	July 1, 1908	1,293,280	
	Kaniksu [g]	Newport, Wash.	July 1, 1908	544,220	
	Lemhi	Mackay	July 1, 1908	955,408	
	Minidoka [h]	Oakley	July 2, 1908	619,204	
	Nezperce	Grangeville	July 1, 1908	1,946,340	
	Payette	Emmett	July 1, 1908	844,240	
	Pend d'Oreille	Sandpoint	July 1, 1908	913,364	
	Pocatello [i]	Pocatello	July 1, 1908	288,148	
	Salmon	Salmon	July 1, 1908	1,762,472	
	Sawtooth	Hailey	July 1, 1908	1,211,920	
	Targhee [j]	St. Anthony	July 1, 1908	1,101,720	
	Weiser	Weiser	July 1, 1908	764,829	
					20,099,029
Kansas	Kansas	Garden City	May 15, 1908	302,387	
					302,387
Michigan	Marquette		Feb. 10, 1909	30,603	
	Michigan		Feb. 11, 1909	132,770	
					163,373
Minnesota	Minnesota [k]	Cass Lake	May 23, 1908	294,752	
	Superior	Ely	Feb. 13, 1909	909,734	
					1,204,486
Montana	Absaroka	Livingston	July 1, 1908	980,440	
	Beartooth	Red Lodge	July 1, 1908	685,293	
	Beaverhead [d]	Dillon	July 1, 1908	1,506,680	
	Bitterroot	Missoula	July 1, 1908	1,180,900	
	Blackfeet	Kalispell	July 1, 1908	1,956,340	
	Cabinet	Thompson Falls	July 1, 1908	1,020,960	
	Custer	Ashland	July 2, 1908	590,720	
	Deerlodge	Anaconda	July 1, 1908	1,080,220	
	Flathead	Kalispell	July 1, 1908	2,092,785	
	Gallatin	Bozeman	July 1, 1908	907,160	
	Helena	Helena	July 1, 1908	930,180	
	Jefferson	Great Falls	July 2, 1908	1,255,320	
	Kootenai	Libby	July 1, 1908	1,661,260	
	Lewis and Clark	Chouteau	July 1, 1908	844,136	
	Lolo	Missoula	Nov. 6, 1906	1,211,680	
	Madison	Sheridan	July 1, 1908	1,102,860	
	Missoula	Missoula	July 1, 1908	1,237,509	
	Sioux [l]	Camp Crook, S. Dak.	Feb. 15, 1909	145,253	
					20,389,696
Nebraska	Nebraska	Halsey	July 2, 1908	556,072	
					556,072

[a] Total of La Sal in Colorado and Utah=474,130 acres.
[b] Total of Las Animas in Colorado and New Mexico=196,620 acres.
[c] Holy Cross divided into Holy Cross and Sopris National Forests, April 26, 1909.
[d] Total of Beaverhead in Idaho and Montana=1,810,820 acres.
[e] Total of Cache in Idaho and Utah=533,840 acres.
[f] Total of Caribou in Idaho and Wyoming=740,740 acres.
[g] Total of Kaniksu in Idaho and Washington=950,740 acres.
[h] Total of Minidoka in Idaho and Utah=736,407 acres.
[i] Total of Pocatello in Idaho and Utah=298,868 acres.
[j] Total of Targhee in Idaho and Wyoming=1,479,320 acres.
[k] Minnesota National Forest created by act of Congress.
[l] Total of Sioux in Montana and South Dakota=249,653 acres.

Location and area of the National Forests in the United States, Alaska, and Porto Rico, and dates when latest proclamations became effective—Continued.

State or Territory.	Forest.	Headquarters of supervisor.	Proclamation effective.	Area.	Total.
				Acres.	*Acres.*
Nevada	Humboldt	Elko	Jan. 20, 1909	1,158,814	
	Inyo [a]	Bishop, Cal.	July 2, 1908	62,573	
	Moapa	Las Vegas	Jan. 21, 1909	390,580	
	Mono [b]	Gardnerville	Mar. 2, 1909	535,337	
	Nevada	Ely	Feb. 10, 1909	1,222,312	
	Tahoe [c]	Nevada City, Cal.	Mar. 2, 1909	61,085	
	Toiyabe	Austin	Feb. 20, 1909	1,678,714	
					5,109,415
New Mexico	Alamo	Alamogordo	Mar. 2, 1909	1,513,817	
	Carson	Antonito, Colo.	Mar. 2, 1909	1,390,680	
	Chiricahua [d]	Douglas, Ariz.	July 2, 1908	178,977	
	Datil	Magdalena	Feb. 23, 1909	2,869,888	
	Gila	Silver City	Feb. 15, 1909	1,782,562	
	Jemez	Santa Fe	July 1, 1908	944,085	
	Las Animas [e]	La Veta, Colo.	Mar. 1, 1907	480	
	Lincoln	Capitan	Mar. 2, 1909	677,790	
	Manzano	Albuquerque	Apr. 16, 1908	587,110	
	Pecos	Santa Fe	Jan. 28, 1909	622,322	
	Zuñi [f]		Mar. 2, 1909	404,000	
					10,971,711
North Dakota	Dakota	Camp Crook, S. Dak.	Nov. 24, 1908	13,940	
					13,940
Oklahoma	Wichita	Cache	May 29, 1906	60,800	
					60,800
Oregon	Cascade	Eugene	July 1, 1908	1,767,370	
	Crater [g]	Medford	July 1, 1908	1,061,220	
	Deschutes	Prineville	July 14, 1908	1,504,207	
	Fremont	Lakeview	July 14, 1908	1,260,320	
	Malheur	John Day	July 1, 1908	1,167,400	
	Oregon	Portland	July 1, 1908	1,787,280	
	Siskiyou [h]	Grants Pass	July 1, 1908	1,264,579	
	Siuslaw	Eugene	July 1, 1908	821,794	
	Umatilla	Heppner	July 1, 1908	540,496	
	Umpqua	Roseburg	July 1, 1908	1,567,500	
	Wallowa	Wallowa	July 2, 1908	1,750,240	
	Wenaha [i]	Walla Walla, Wash.	Mar. 1, 1907	494,942	
	Whitman	Sumpter	July 1, 1908	1,234,020	
					16,221,368
South Dakota	Black Hills	Deadwood	Feb. 15, 1909	1,190,040	
	Sioux [j]	Camp Crook	Feb. 15, 1909	104,400	
					1,294,440
Utah	Ashley [k]	Vernal	July 1, 1908	947,490	
	Cache [l]	Logan	July 1, 1908	257,200	
	Dixie [m]	St. George	Feb. 10, 1909	475,865	
	Fillmore	Beaver	July 1, 1908	578,459	
	Fishlake	Salina	July 2, 1908	537,233	
	La Sal [n]	Moab	Mar. 16, 1909	444,628	
	Manti	Ephraim	Apr. 25, 1907	786,080	
	Minidoka [o]	Oakley, Idaho	July 2, 1908	117,203	
	Nebo	Nephi	July 1, 1908	343,920	
	Pocatello [p]	Pocatello, Idaho	July 1, 1908	10,720	
	Powell	Escalante	July 2, 1908	726,159	
	Sevier	Panguitch	Jan. 17, 1906	710,920	
	Uinta	Provo	July 1, 1908	1,250,610	
	Wasatch	Salt Lake City	July 2, 1908	249,840	
					7,436,327
Washington	Chelan	Chelan	July 1, 1908	2,492,500	
	Columbia	Portland, Oreg.	July 1, 1908	941,440	
	Colville	Republic	Mar. 1, 1907	869,520	
	Kaniksu [q]	Newport	July 1, 1908	406,520	

[a] Total of Inyo in California and Nevada=1,521,017 acres.
[b] Total of Mono in California and Nevada=1,349,126 acres.
[c] Total of Tahoe in California and Nevada=1,992,127 acres.
[d] Total of Chiricahua in Arizona and New Mexico=466,497 acres.
[e] Total of Las Animas in Colorado and New Mexico=196,620 acres.
[f] Total of Zuñi in Arizona and New Mexico=670,981 acres.
[g] Total of Crater in California and Oregon=1,119,834 acres.
[h] Total of Siskiyou in California and Oregon=1,302,393 acres.
[i] Total of Wenaha in Oregon and Washington=813,342 acres.
[j] Total of Sioux in Montana and South Dakota=249,653 acres.
[k] Total of Ashley in Utah and Wyoming=952,086 acres.
[l] Total of Cache in Idaho and Utah=533,840 acres.
[m] Total of Dixie in Arizona and Utah=1,102,665 acres.
[n] Total of La Sal in Colorado and Utah=474,130 acres.
[o] Total of Minidoka in Idaho and Utah=736,407 acres.
[p] Total of Pocatello in Idaho and Utah=298,868 acres.
[q] Total of Kaniksu in Idaho and Washington=950,740 acres.

Location and area of the National Forests of the United States, Alaska, and Porto Rico, and dates when latest proclamations became effective—Continued.

State or Territory.	Forest.	Headquarters of supervisor.	Proclamation effective.	Area.	Total.
				Acres.	
Washington	Olympic	Olympia	Mar. 2, 1907	1,594,560	
	Rainier	Orting	July 1, 1908	1,641,280	
	Snoqualmie	Seattle	July 1, 1908	961,120	
	Washington	Bellingham	July 1, 1908	1,419,040	
	Wenaha [a]	Walla Walla	Mar. 1, 1907	318,400	
	Wenatchee	Leavenworth	July 1, 1908	1,421,120	
					12,065,500
Wyoming	Ashley [b]	Vernal, Utah	July 1, 1908	4,596	
	Bighorn	Sheridan	July 2, 1908	1,151,680	
	Bonneville	Pinedale	July 1, 1908	1,627,840	
	Caribou [c]	Idaho Falls, Idaho	Jan. 15, 1907	7,740	
	Cheyenne	Laramie	July 1, 1908	617,932	
	Hayden [d]	Encampment	July 1, 1908	370,911	
	Shoshone	Cody	July 1, 1908	1,689,680	
	Sundance	Sundance	July 1, 1908	183,224	
	Targhee [e]	St. Anthony, Idaho	July 1, 1908	377,600	
	Teton	Jackson	July 1, 1908	1,991,200	
	Wyoming	Afton	July 1, 1908	976,320	
					8,998,723
Total of 147 National Forests in the United States					167,677,749
Alaska	Chugach	Ketchikan	Feb. 23, 1909	11,280,640	
	Tongass	Ketchikan	Feb. 16, 1909	15,480,986	
					26,761,626
Porto Rico	Luquillo		Jan. 17, 1903	65,950	
					65,950
Grand total of 150 National Forests					194,505,325

[a] Total of Wenaha in Oregon and Washington=813,342 acres.
[b] Total of Ashley in Utah and Wyoming=952,086 acres.
[c] Total of Caribou in Idaho and Wyoming=740,740 acres.
[d] Total of Hayden in Colorado and Wyoming=454,911 acres.
[e] Total of Targhee in Idaho and Wyoming=1,479,320 acres.

The following national monuments situated within National Forests have been created under the act of June 8, 1906 (34 Stat., 225), for the preservation of objects of historic or scientific interest:

Name.	National Forest.	State.	Date.	Area.
				Acres.
Cinder Cone	Lassen	California	May 6, 1907	5,120
Gila Cliff-Dwellings	Gila	New Mexico	Nov. 16, 1907	160
Grand Canyon	Coconino and Kaibab	Arizona	Jan. 11, 1908	806,400
Jewel Cave	Black Hills	South Dakota	Feb. 7, 1908	1,280
Lassen Peak	Lassen	California	May 6, 1907	1,280
Pinnacles	Monterey	California	Jan. 16, 1908	2,080
Tonto	Tonto	Arizona	Dec. 19, 1907	640
Wheeler	Cochetopa and Rio Grande	Colorado	Dec. 7, 1908	300
Mount Olympus	Olympic	Washington	Mar. 2, 1909	608,640
Total area of national monuments within National Forests				1,425,900

The following national game preserves situated within National Forests have been designated under special acts of Congress for the protection of wild animals:

Name.	National Forest.	State.	Act approved.	Proclamation effective.	Area.
					Acres.
Grand Canyon	Coconino and Kaibab.	Arizona	June 29, 1906 (34 Stat., 607).	June 3, 1909	1,492,928
Wichita	Wichita	Oklahoma	Jan. 24, 1905 (33 Stat., 614).	June 2, 1905	57,120

SCHOOLS OF FORESTRY.

Post-Graduate Schools.

Yale University, Forest School, New Haven, Conn.—A two years' post-graduate course, leading to the degree of Master of Forestry. Under the direction of the officers of the Yale Forest School a two months' summer course, July and August, is conducted at Milford, Pike County, Pa. Prof. Henry S. Graves, Director.

University of Michigan, Forest School (part of the general Department of Literature, Science, and the Arts), Ann Arbor, Mich.—A two years' post-graduate course, leading to the degree of Master of Science in Forestry. A six weeks' summer course, in July and August, is conducted on the state reserve at Roscommon. Prof. Filibert Roth, Professor of Forestry.

Harvard University, Forest School, Cambridge, Mass.—A two years' graduate course, in connection with the Graduate School of Applied Science. Prof. R. T. Fisher in charge of curriculum.

Undergraduate Schools.

Biltmore Forest School, Biltmore, N. C.—Course covers one full year, leading to the degree of Bachelor of Forestry, and, with two years of practical forest work, the degree of Forest Engineer. Dr. C. A. Schenck, Director.

University of Minnesota, School of Forestry, St. Anthony Park, Minn.—A four years' undergraduate course, leading to the degree of Bachelor of Science in Forestry. A six weeks' summer course, in July and August, is conducted at the Itasca State Forest. Prof. Samuel B. Green, Professor of Forestry.

University of Nebraska, Department of Forestry, Lincoln, Nebr.—A four years' undergraduate course, leading to the degree of Bachelor of Science. Frank J. Phillips, Professor of Forestry.

Michigan State Agricultural College, Department of Forestry, East Lansing, Mich.—A four years' undergraduate course, leading to the degree of Bachelor of Science. J. Fred Baker, Professor of Forestry.

Pennsylvania State College, Forest School, State College, Pa.—A four years' undergraduate course, in connection with the State Department of Agriculture, leading to the degree of Bachelor of Science. Hugh P. Baker, Professor of Forestry.

University of Washington, School of Forestry, Seattle, Wash.—A four years' undergraduate course, leading to the degree of Bachelor of Science in Forestry. Frank J. Miller, Professor of Forestry.

University of Georgia, Department of Forestry, Athens, Ga.—A four years' undergraduate course, leading to the degree of Bachelor of Science in Forestry. Alfred Akerman, Professor of Forestry.

Colorado School of Forestry, Colorado Springs, Colo.—A three years' undergraduate course, leading to the degree of Bachelor of Forestry. No entrance requirements. A summer course is conducted at Manitou Park from July 15 to September 15.

The Mont Alto Forest Academy, Mont Alto, Pa.—Maintained by the Pennsylvania Department of Forestry, for the training of young men of the State for work on the State forest reserves. Geo. H. Wirt in charge of forest courses.

Courses in forestry are now given at the University of Maine, Orono, Me., Gordon E. Tower, in charge; Iowa State College, Ames, Iowa, Chas. A. Scott, in charge; Mississippi Agricultural and Mechanical College, Agricultural College, Miss., Geo. L. Clothier, in charge; Purdue University, Lafayette, Ind., Prof. Stanley Coulter, in charge; the University of West Virginia, Morgantown, W. Va., Prof. A. W. Nolan, in charge; Berea College, Berea, Ky., W. L. Flanery, in charge; State College of Washington, Pullman, Wash., E. O. Siecke, in charge; Winona Agricultural Institute, Winona

Lake, Ind., W. R. Eastman, in charge; North Dakota School of Forestry, Bottineau, N. Dak., J. Allen Kemp, president.

A course of lectures is given annually at the Massachusetts State Agricultural College, Amherst, by Prof. Frank Wm. Rane, State Forester of Massachusetts; at the Maryland Agricultural College, College Park, by Fred W. Besley, State Forester of Maryland; at the University of Wisconsin, Madison, by Edward M. Griffith, State Forester of Wisconsin; at the Agricultural College of Utah, Logan, by W. W. Clark; at the Connecticut Agricultural College, Storrs; at the State Agricultural College of Colorado, Fort Collins; at the University of California, Berkeley, and at Stanford University, California.

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